Some new forage, fiber and other useful Plants

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THE NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

AND

THE FERTILIZER CONTROL STATION

UNDER THE CONTROL OF THE

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RALEIGH, N. C.

Summary.

[The following two pages is a general summary of the detailed tests of the various plants under trial. The full bulletin, illustrated with half-tone photographs, will be sent to those who apply for it, and to those who have lately applied for other complete bulletins. Make applications for Bulletin 133, *complete*, to Dr. H. B. Battle, Director, Raleigh, N. C.]

"Unknown" Cowpea.—Large, irregular, light brown. Best of all peas for forage or green manure. This pea has been imposed on the public under name of "Wonderful." It is a very late pea.

"Red Ripper" Cowpea.—Large, bright red. A vigorous grower, and for forage is second only to the "Unknown." For very sandy soil superior to any other.

Rice Pea.—Is a small white pea, cooks like rice and is the best table variety of cowpea. Early. Medium grower and heavy yielder of seed.

Banana or Velvet Pea.—*Dolichos multiflorus.* A tropical species. Rampant grower, but too late and tender to mature seeds in North Carolina. Recommended only as an ornamental climber to shade or cover buildings.

Pearson Bean.—A very large white bean, resembling a bush lima bean. Heavy yielder of seed. Quality for table poor. Perfectly free from disease.

Hagy.—*Lespedeza bicolor.* A new Japanese legumine. Perennial. Grows four to six feet, blooms late and remains green until after hard frost. Becomes woody soon after flowering. Very promising for light and dry soils. Perfectly hardy in North Carolina.

Hairy Lespedeza.—*Lespedeza sericea.* A sister species to Hagy, but much inferior. Less leafy and yields less than one-half that species.

Broad-leaved Japan Clover.—An improved and vigorous variety of the common Japan clover. Very much superior to the common variety. Annual, but reseeds itself each year.

Beggar Weed.—*Desmodium tortuosum.* Annual. Vigorous grower, bushy, six to eight feet. woody, seeds abundantly. Inferior to cowpea for forage. Could not be plowed under when full grown.

Chicory.—*Chicorium Intybus.* Perennial, herbaceous. Vigorous grower. Valuable for poultry and sheep. The root makes an excellent substitute for coffee. Perfectly hardy.

Fenugreek.—*Trigonella Fœnum-Græcum.* Annual. Low and weak grower. Seed very aromatic and stimulant. Too low to be cut by mower. Light yielder of seed. Not a promising crop for soils lacking in lime.

Horse Bean.—*Vicia faba* Annual. Low, weak grower and shy yielder. Plant invariably mildews, and has no value for our climate, whether planted in spring or fall.

Canada Field Pea.—*Pisum sativum.* Annual, vigorous grower and heavy yielder of forage. Mildews as soon as hot weather comes on. Valuable when planted in February or March, or may be planted in December not less than four inches deep.

Spring Vetch.—*Vicia sativa.* Annual. True spring variety hard to get. As commonly grown, is a poor, weak grower, far inferior to Canada pea.

Hairy Vetch.—*Vicia villosa.* Annual. Superior to common Spring Vetch, but best sown in fall. Perfectly hardy. Stems weak and require support from rye or oats. Hay inferior and not relished by stock. More reliable than crimson clover, but less valuable.

Furze.—*Ulex Uropea.* Perennial. Low-growing, woody and thorny. The common growth of waste lands in northern Europe. Seed very difficult to germinate, and plant does not thrive in our climate. Not valuable.

Broom.—*Genista scoparia.* Perennial, shrubby legumine. A common plant on waste lands of Scotland. Not thorny and superior to furze. Has been natu-

ralized in some of the mountain valleys, but does not succeed in the middle or coast districts.

Spurry.—*Spergula arvense*, and *S. maxima*. Two annuals of the chickweed family. A weak grower and very shy yielder of forage. Does not withstand our hot, dry summers. No value for central North Carolina.

Burnet.—*Poterium sanguisorba*. Perennial. Low, growing in tufts. Not liked by stock, and has little value. In Europe is used as a salad plant.

Soccaline.—*Polygonum saghalinse*. Perennial, tall, bushy, broad-leaved plant of the knot-weed family. Grows about four feet high. Stems are woody, and the broad, oval, heart-shaped leaves are diseased by a species of rust fungus. Has no value for North Carolina.

Flat Pea.—*Lathyrus sylvestris, wagneri*. A perennial legumine. Grows three or four feet long, weak and flat on the ground. Requires three or more years to secure a stand, and is then of no practical value for North Carolina.

Sesame.—*Sesamum Indicum*. Annual, of the figwort family. Much valued in India for its oily seeds. Grows two and a half to three feet. Large yielder of seeds, which ripen unevenly, causing much loss by shelling out. Valuable only for poultry yards.

Madder.—*Rubia tinctoria*. Perennial herb of the coffee-tree family. Formerly highly valued for the dye yielded by its roots, but now superseded by aniline dyes. Perfectly hardy and succeeds well in North Carolina, but has no commercial value.

Rape (Russian).—*Brassica campestris*. Annual of the cabbage family. Very hardy, but slow grower. Six to ten inches, leafy. Becomes diseased as soon as the weather gets warm. Much inferior to the turnip for North Carolina.

Madia.—*Madia sativa*. An annual herb of the composite or daisy family. Low growing; yields abundantly of oily seeds. Whole plant liked by sheep, but scarcely worth growing.

Fuller's Teasle.—*Dipsacus fullonum*. A biennial plant of the Scabbiosa family. The hooked tips of the chaff of the seed-heads or burrs are used in putting a nap on broadcloth. The plant grows thirty inches high in two years, is perfectly hardy and healthy and makes large burrs. Not much demand for the product.

Canaigre.—*Rumex hymenosepalus*. Perennial, of the sheep-sorrel family. The roots contain a large percentage of tannic acid, used in tanning skins. A very feeble grower, appearing above ground about November 1st and growing until May 1st. Requires three to five years to mature a crop of roots. Value of this plant not yet sufficiently determined for this latitude.

Jute.—*Corchorus capsularis*. Annual plant of the Linden family. Extensively grown in Asia for its fiber, the common cotton-bagging of the South. With us, it grows six to eight feet high, and matured seed about October 1. An easy crop to grow, but requires moist and rich soil. Will succeed well on the rice-lands and river-bottoms or swamp-lands of the coast district. There is a market for the product when it is rightly prepared, and the crop merits the attention of farmers in the district named.

Japan Hemp.—*Cannabis sativa, japonica*. Annual plant of the nettle family. Grows eight to ten feet high; very leafy. Will succeed well on the rice-lands and rich bottoms of the coast district. The product is large and valuable. Deserves attention from the farmers of the coast district. Not recommended for the middle or western districts.

Persian Hemp.—*Cannabis sativa, persica*. Another variety of the above plant. Valued for its seeds more than for its fiber. The seeds are used as food for caged birds. Grows about three feet high and produces abundance of seeds. Easily grown, but no great demand for the seed.

Kentucky Hemp.—*Cannabis sativa*. Annual. Much less vigorous and in every way inferior to Japan hemp. This variety requires a rich limestone soil, and has little or no value for North Carolina.

Ramie.—*Urtica nivea*. Appears to be a valuable fiber-producing plant, and one suited to the warm, moist climate of eastern North Carolina, especially in the rich river bottoms.

Some New Forage, Fiber, and other Useful Plants.

By Gerald McCarthy, Botanist.

[For a summary of this bulletin, see the preceding two pages.]

The North Carolina Experiment Station, as the result of several years test of cowpeas and other leguminous forage plants, has already printed in bulletin No. 98 the comparative results of all the varieties the Station had up to that time been able to secure.

Cowpeas.—It was shown that of all the varieties tested the most successful, all around peas, were the "Unknown" and the "Red Ripper." In the spring of 1895, the small amount of these two varieties that were grown during the test were distributed, for further trial, in ½ pound packages, to farmers in different parts of the State. In all, about 250 lots were sent out. Of those receiving the peas, 57 farmers reported results to the Station, some of which are summarized below. None of those who reported were dissatisfied with the peas, and the general verdict was that they were much superior to the old standard varieties.

During the season of 1896 we tested some other varieties of peas and various leguminous forage plants. The results are here given in the hope that the farmers of North Carolina may be induced to test, on their own farms, those which we are able to recommend from our experiments in Wake county.

The "Unknown" Cowpea.—The "Unknown" or "Innominate" or "No name" cowpea has been known and variously designated in North Carolina and Georgia for 10 years or longer. It is a rather large, drab-colored or light-brown pea. Requires a long season, and does not mature all its pods anywhere in North Carolina if planted later than May 15. It is a most luxuriant grower, and the vines often attain a length of 20 feet. This pea has been extravagantly praised and sold at high prices by some seedsmen under the name of "Wonderful" pea, but its true and older name is the "Unknown," under which name it can be purchased at from 75 cents to $1.50 per bushel. The following are the opinions of farmers who grew it last year from seed sent out by the Station:

E. F. Roberts, Loretta, N. C.—(Soil, exhausted, light land.) For forage, it is worth twice as much as any other pea I have tried.

S. R. Copeland, Eagletown, N. C.—(Soil, fair, sandy loam.) Planted same time as black pea (June 20); they failed to mature seed Heavy growth of vine.

O. F. Womble, Lockville, N. C.— Soil, fair, gray land.) Makes the most vigorous growth of any pea I have tried, and gives a fine yield.

C. C. Lindley, Old Fort, N. C.—(Soil, sandy loam.) Superior to any of 5 or 6 varieties I have tried, both in yield of seed and vine. It is very late, and many pods were green when killed by frost. Will plant them largely next year.

A. L. Pope, Vaughan, N. C.—(Soil, sandy.) It is the finest pea I have ever grown. Makes twice the growth of the blackeye pea.

J. H. Carroll, Pernell, N. C.—(Soil, light gray.) Makes the largest vine I ever saw.

Dr. B. F. Cox, Redalia, N C.—(Soil, sandy.) The best fertilizer pea, and not exceeded by any as forage for stock.

D. M Gray, Millboro, N. C.—(Soil, clay and sand.) Planted April 29, had ripened about 95 per cent. of its pods when killed by frost From ½ pound of seed got 69 pounds ripe peas Vines about 16 feet long.

J. W. Williams, Tippecanoe, N. C.—(Soil, sandy.) A very good fertilizer pea, and of excellent table quality.

H. R Berrier, Bagdad, N. C.—(Soil, sandy) Very prolific. When the growing season is long enough, there is no variety that can beat it.

W. D. Slay, Teachey's, N. C—(Soil, black.) Worth twice as much as any of the old varieties.

W. R. Myers, Yeatesville, N. C.—(Soil, swampy.) Very vigorous, with large vine, but late. I did not save a dozen pods before frost.

The "Red Ripper" Cowpea.—This a large, oval, bright red pea. A vigorous grower, with large, long pods. Ripens about 3 weeks earlier than the "Unknown." Grows especially well on dry, sandy soil, for which it is superior to the "Unknown."

G. W. Alley, Sr., Greensboro, N. C.—(Soil, gray.) The "Red Ripper" is the finest cowpea I ever raised. The growth was rank.

W. W. Chauncey, Mineola, N. C.—(Soil, gray.) It is one-third better than any pea I have ever raised.

C. G. Wells, Warsaw, N. C.—(Soil, sandy loam.) This is an early pea, and I think it very fine for hogs, as it does not rot easily.

C. H. Prince, Henderson, N. C.—(Soil, sandy.) The Red Ripper yields well, and the pods nearly all ripen together, so that one can pick them pretty fast.

J. G. Newsome, Littleton, N. C.—(Soil, stiff, red clay.) This pea excels any of the old varieties, and stands next to the "Unknown." It is much earlier than the "Unknown," and ripens before frost.

It will be seen from the above reports from all parts of the eastern and middle districts of the State that in these two varieties the farmers of North Carolina will find the best peas for forage and green manure. If a choice must be made between them, the "Unknown" will be the better for rich, moist or clayey lands, when planted not later than May 20. The "Red Ripper" will mature seed if planted before June 15, and as a rule gives better results than the "Unknown" on light, sandy soil. For table use the "Unknown" is the better.

The following forage and other plants, promising of value, for this State, have been tested with the results given below:

Rice Pea.—*Dolichos sinensis.* Pea small, oval, white, semi-translucent, resembling rice. Vine creeping. Very vigorous grower. Stem 4 to 8 feet long. Leaves small to medium. Matures in medium season—with us planted May 1, ripe October 10. Yield of vines moderate, of seeds heavy. The table quality of this pea is considered superior to that of any other of the cowpea family. It deserves a more extended trial. The Station has a small supply for distribution to citizens of the State in spring of 1897.

Banana or Velvet Pea.—*Dolichos multiflorus* (Plate I). The banana pea is not a true cowpea, though closely related. Its botanical name is *Dolichos multiflorus*, and it is a native of the southern part of Florida, extending southward into the tropics. This pea is much more tender as regards cold than the common cowpea, and this, with its extremely long season of growth, reduces very considerably its agricultural value for North Carolina and colder States. The seeds are large, roundish, granite color and speckled, like the common "speckled" pea. The growth of vine is enormous, far exceeding any other legumine known to agriculture, reaching 20 to 30 feet. The root is very large, and reaches far into the depths of the soil. With us, the seed planted April 15, sprouted slowly, but

PLATE I.—Banana or Velvet Pea.

when established grew vigorously, not minding drought, and came into bloom September 20. A few pods were full grown, but green, when the plants were cut down by frost October 19. We saved no seed of this plant.

Pearson Bean.—*Phaseolus sp.* (Plate II—2). A true bean, resembling one of the larger seeded dwarf lima beans in form of seed and habit of plant. Root small. Planted April 15, germinated vigorously, and grew rapidly until drought set in. Began to flower July 10. It first flowers at base of plants. Continued to flower till frost, the flowers extending up the rigid woody stem. Pods first formed at base of stalk. Grew to be 12 to 15 inches long, and ¾ to

1 inch wide. Filled with large white flattish seeds. Quality of seeds insipid and poor. The bean, on being boiled, falls into mush. Yield estimated at 40 bushels per acre.

This plant is valuable only for the ripe seeds as food for man or beast. Might take the place of the English broad bean as a food for horses. The Station will distribute a small quantity of this seed during the spring of 1897.

PLATE II.—1. Chicory. 2. Pearson Bean.

Hagy.—*Lespedeza bicolor* (Plate III—2, and Plate V—1). Hagy (called *Hagi* in Japan) is a new forage plant of the Lespedeza genus, which genus is so well known to us in Japan clover (*Lespedeza striata*). In growth, habit and value it resembles the Florida Beggar-weed, but is a hardy perennial. In Japan, it grows wild on dry, sandy or gravelly waste grounds, but is not cultivated.

The seed sprouts readily, grows rapidly and bushy. Planted April 15, came into flower about September 1. Flowers very small and blue. Set a heavy crop of seed, which were not all matured when severe frost came October 19. Five degrees below freezing did not hurt the foliage, which remained green until after November 10. The bush-like plants are very leafy, attain a final height of 4 to 4½ feet, soon becoming woody at base. Its value for feed is not yet determined. This promises to be a very valuable plant for seeding down fields too poor to give a catch of clover. The seed were secured from the Imperial Japanese College of Agriculture. The Station has no seed for distribution this year.

PLATE III.—1. Peanut. 2. Hagy.

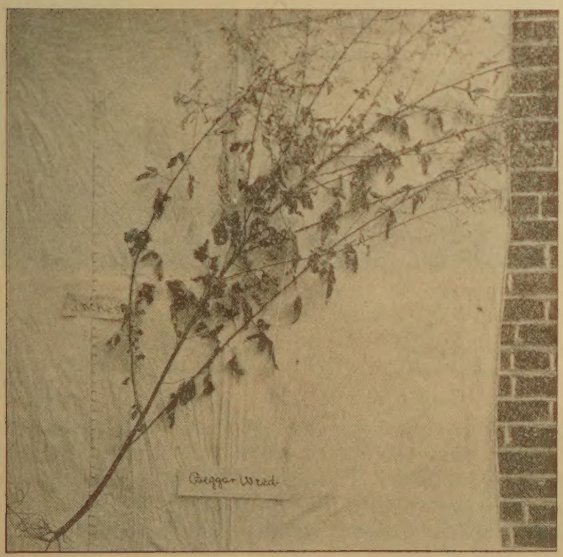

PLATE IV.—Beggar Weed

Hairy Lespedeza.—*Lespedeza sericea* (Plate V—2). This is a sister species to Hagy, and was obtained from the same place. Its growth is much lower and more slender than Hagy; the leaves though very abundant are small, and the whole plant is so greatly inferior to Hagy that its practical value may be considered very small.

Japan Clover, Improved.—*Lespedeza striata, var. lata* (Plate V—4). This is a broad leaved and stronger growing variety of the common Japan clover. The two varieties were grown side by side,

1 2 3 4

PLATE V.—

1. Hagy, *Lespedeza bicolor.* 2. Hairy Lespedeza, *Lespedeza sericea.* 3. Japan Clover, Common, *Lespedeza striata.* 4. Japan Clover, Improved, *Lespedeza striata.* 5. Chi *Chico Inty*

and the broad-leaved variety showed such immense superiority over the old variety that the latter should be discarded and only the former grown hereafter. In habit of growth the improved variety is creeping and grows in a flat rosette on the ground. Produces seed at same time as common variety, and in about equal abundance. We have no seed to spare this year.

Beggar Weed.—*Desmodium tortuosum* (Plate IV). On the poor, sandy soils of Florida scarcely any leguminous plant will grow except beggar weed and Lupines. Lupines are worthless as forage, as they contain a bitter and poisonous principle. Beggar weed is closely related to the *Lespedezas*, and greatly resembles Hagy. It is more tender, and with us behaves as an annual. Planted April 15, grew rapidly, and by August 1 was 24 inches high, and seemed unaffected by drought which set in about August 15. By October 1 was 5 feet high, very leafy and in flower. Seeded abundantly; seed ripe about October 15. Plants became woody very early, and by time of flowering the stems were hard and dry enough to make good fuel. We did not test its value for feed. The root is large and runs deep. Showed no root tubercles. If this plant, on further trial, shows the root tubercles through which leguminous secure nitrogen from the air, this may prove a valuable green manurial plant for light soils, such as peach and plum orchards. Stock can no doubt be taught to eat the stems if cut when young, but its fodder value is small where better plants will grow. We have no seed to spare this year.

Chicory.—*Chicorium Intybus* (Plate II—1, and Plate V—5). This is a perennial, deep rooting plant of the Aster family, which is not rich in food plants for man or beast. Chicory is mainly valued for its root, which, when parched and ground as ordinary coffee is, makes a drink resembling coffee, for which in Europe it is often substituted. The leaves are large and resemble those of a thistle, but are not prickly. They are eaten by sheep, also by fowls and rabbits. As fodder this plant is used only as a stimulant or stomachic, with other feed. We recommend it for sowing in a small way. We have no seed to spare.

Fenugreek.—*Trigonella Fœnum Græcum*. This is an annual of the leguminous family, valuable for its aromatic, stimulant seeds, which are a chief constituent of many of the patent cattle foods. Planted April 22, by May 1 had attained height of 4 to 6 inches. Leaves resemble those of lucerne, but longer. Pods 1½ to 3 inches long, with slender beak. Pods ripen from bottom towards top of stems, and the older ones burst and shatter out their seeds before the later pods are ripe, so it is necessary to harvest while many pods are still green. The plant grows only 8 to 10 inches high, and could not be cut by machine. All cut by July 15. Yield of seed small. As a market crop this is not very promising.

Horse-Bean.—*Vicia Faba*. This is the English broad bean so much esteemed for feeding horses in England. It is not a true bean, but a kind of vetch (*Vicia*). We have tried this bean several times, both spring and fall, and in every case have barely harvested as much seed as was planted. Sown April 23, it sprouted rapidly, and by May 15 was 10 inches high, and full flower. The pods, as fast as they developed, became covered with black mould, which soon covered the whole plant and prevented further growth.

The plants were dead July 1, being then about 15 inches high. Yield of seed but little more than was planted. We planted freshly imported seed October 9. By December 12 the plants were 8 to 10 inches high, in full flower, but showed considerable damage from frost. Cut down to ground before maturing seed. Not hardy here.

Canada Pea.—*Pisum sativum.* This is a true pea, and a variety of the smooth garden pea. Planted April 23, by May 15 was 15 inches high and in full flower. By June 10 some pods were full grown, but new flowers continued to appear. The lowermost leaves soon began to mildew, and by July 1 crop was about all dead, having ripened a fair crop of seeds.

Our experience shows this to be a very promising spring or fall sown crop, and much superior to spring vetch. It is very hardy, and withstands cold much better than it does heat. For the best results, it should be sown very early in spring—in central North Carolina about February 15, or if sown about December 1 and covered deeply—4 to 6 inches—it will appear about March 1 and give a heavy cutting of excellent forage by May 1. It rapidly deteriorates after May 15, and should always be cut before that date. It is chiefly valuable for hay, which is better and more liked by stock than either vetch or cowpea hay. In field practice 1½ to 2 bushels with ¼ bushel of rye per acre is sown and plowed—not harrowed—in 4 to 6 inches deep.

Spring Vetch.—*Vicia sativa.* This is the common vetch of seedsmen. There are two varieties—spring and fall—but the fall variety is the more common and cheaper seed, and is probably pretty generally supplied even when the spring variety is called for. We have rarely been able to get a satisfactory growth of spring sown vetch. It is far inferior to the Canada pea and requires better and moister soil.

Sown April 23, gave a very good stand by May 15. By June 15 plants began to mildew, and by July 1 all were dead without producing seed.

Hairy Vetch.—*Vicia villosa.* This is a sister species of the common vetch which has been recently introduced from Eastern Europe. Its special recommendation is that it will grow upon soil too poor and sandy to produce any other legumine except cowpeas. We have tried it from spring and fall sowings, and got best results from seed sown not later than October 1. It is of slender, weakly growth, falling on the ground unless held up by intermixed rye or oats. The yield of fodder is about ½ that produced by fall or winter vetch, and the quality is inferior. It seems to contain a bitter principle, which makes it distasteful to horses and cows. Its chief value to us will be for green manure on very sandy soils. For this purpose it should be sown during October without intermixture, and covered about 4 inches deep. It should be plowed under in spring. About 40 lbs. of seed per acre will be sufficient.

Furze.—*Ulex Europea.* This is the moor plant, commonly known in England and Scotland as furze, gorse and whin. It oc-

cupies waste lands and furnishes considerable grazing, besides food for game and even firewood for the people. It is a creeping, shrubby plant, very prickly, and a member of the legumine family. We have made several attempts to grow this plant. The seed comes up very sparingly, and the plants are invariably killed by our hot, dry summers.

Broom.—*Genista scoparia.* "Broom" is another moor plant of Scotland and England. It gave its generic name (*Genista*) to the Norman kings of England (Plantagenets.) It is a more valuable forage plant than furze. It has been domesticated in parts of our mountain counties, but all attempts to grow it in central North Carolina have failed.

Spurry.—*Spergula arvensis.* Spurry belongs to the chick weed family, naturally abounding on poor, sandy soils. There are two varieties—common and Giant spurry. The only apparent difference is that the latter grows a few inches taller. We cannot advise the planting of spurry, and consider it of no value.

Sown April 23, it vegetated rapidly, and by June 15 was about 10 inches high for the common, and 12 to 15 inches for the Giant varieties. It matured seed abundantly, and died before July 1. The seed did not come up again until the ground was re plowed in October and sown in another crop. The spurry then appeared, and promises to be a troublesome weed. The plant has very small and thread-like leaves, and would, if cut, hardly yield ½ ton of hay per acre.

Burnet.—*Poterium Sanguisorba.* Burnet belongs to the rose family, and is closely related to the common "five fingers" of the garden corners. It is a perennial, rather deeply rooting, and grows about 12 inches high. It burns up during drought, but turns green again as soon as the rains return and remains so all winter. It is not a legumine, and therefore does not collect nitrogen from the atmosphere. Its economic value is very small.

Saccaline.—*Polygonum saghallinense.* The Station has had this much-praised forage plant under trial for three years. The results have not disappointed us, for we expected nothing good from a plant of the smart-weed family, which are all too common wherever our lands are moist. The preposterous claims put forward by the introducers of this plant gave it the stamp of charlatanism, which its character does not belie. With us, the seed from repeated sowings failed to germinate. We then secured roots. These have held the ground, each year sending up several shoots well covered with long oval leaves. The shoots never attain a height of over 3 feet. The leaves soon become gnawed by insects, and fall away in large patches from the attack of a parasitic fungus. We consider the plant worthless for forage.

Flat Pea.—*Lathyrus sylvestris, Wagneri.* The flat pea we place next to Saccaline as the most loudly trumpeted swindle perpetrated upon a long-suffering public in recent years. We have had this

plant under observation for four years, during which a row one-half rod long has never produced enough food for a rabbit. It grows flat on the ground to a length of 12 to 15 inches. As the branch elongates and puts forth new leaves, those behind decay.

Sesame.—*Sesamum Indicum.* Sesame belongs to the fig wort family (*Scrophulariacea*), and is valued only for its oil-bearing seeds. The plant is an annual, and grows about 2 feet high. It begins to flower when the stems are about 12 inches high. As the stems elongate, new flowers appear, and we eventually find ripe capsules below and green ones in the middle and flowers at the top. The lower capsules burst and the seeds shatter out before those above are ripe. The ground is thus fouled with the seed, which may prove hard to destroy. The plant is not promising except for poultry yards.

Russian Rape.—*Brassica compestris* Rape is a kind of wild cabbage. There are several varieties, of which the Dwarf Essex is most esteemed. Our seed was the product of a sample originally included in the Russian Exhibit at the Chicago World's Fair. We have tried it both in spring and fall sowings, but neither have given any good results. Sown in the fall, the plants attain 3 or 4 inches of growth and then remain stationary till spring. They start to grow again in February or March, and soon go to seed. Planted in spring, the plants thrive until warm weather, when they are attacked by disease and soon die out.

Madder.—*Rubia tinctoria.* This plant belongs to the natural family which includes also the coffee and cinchonia (quinine) trees, besides numerous ornamental shrubs. Madder grows creeping on the ground, resembling the common weed called "tear-thumb," or "cleavers."

The plant is valued for its slender roots, which give a beautiful and formerly much-valued red dye, which has, however, of recent years been largely supplanted by the coal tar or aniline dyes. The plant grows luxuriantly with us, and from its habit of forming a close mat on the ground, does not require much labor in keeping free from weeds. The demand is too small at present to make this a profitable crop.

Madia.—*Madia sativa.* This is an annual of the Aster family, valued for its oily seeds and as green forage for sheep. Seed sown April 23, grew well, and by June 15 had covered the ground 3 to 4 inches high. Grew very rapidly after hot weather began, and by July 15 was 14 inches high and in flower. Leaves large and very aromatic. Seed-heads ripen very unevenly and shatter out easily. As a condiment in a mixture for sheep pasturage, this plant may have considerable value.

Fuller's Teasle.—*Dipsacus fullonum.* This plant belongs to the Teasle, or Scabbiosa, family. It is valued for its ripe seed-scales, which have at the tip two sharp hooks which are utilized by manufacturers to produce the "nap" on broadcloth. For this purpose the plant is largely cultivated in Europe. In America broad-

cloth is not manufactured sufficiently to make a market for the teasles, but our experiment shows that we can grow the plant with success. Planted April 23, gave a very good stand. By July 10 was 10 inches high and very luxuriant. Leaves all radical, or from the root, the first year, no flowering stems being sent up. The second year, started early in spring, and by May 15 was 30 inches high in flower. Continued flowering for two months. The seeds ripened from base towards tip of seed-head, and the lowermost were mature and began to shatter out while those in middle were green and new flowers forming at top. By July 1 plants were 40 inches high and seed heads fully mature. Were cut with scythe. About two-thirds of the seed were lost. This is a very easy crop to grow, but as it requires two years to make a crop, and a deal of hand work to save seed enough for the succeeding crop, it will not be profitable until the product is more in demand than it is at present.

Canaigre.—*Rumex hymenosepalus.* Canaigre is a sister species to some of our most common and obnoxious weeds—the docks and sheep sorrel. This species is native of the arid soils of the Rocky Mountain regions. It has recently come into prominence as a source of tannic acid. Roots from New Mexico were planted October 20, 1895, soon showed leaves above ground and grew slowly during the winter. By March 1 leaves were 4 to 5 inches long. By May 15 had ceased to grow, and leaves soon after withered and died. The old roots had in the meantime given small off-sets somewhat larger than a lead pencil. The roots remained dormant in the ground all summer, and have started again in the fall. The plant is of very slow growth, and makes the whole growth between November 1 and March 1. In practical farming a field of this plant would be completely overgrown by crab-grass during summer months and would be difficult to clean for the winter growth of the plant. It will require 4 or 5 years to grow a crop from a setting of roots. It will take further trial to determine the real value of this plant for our side of the continent.

Jute.—*Corchorus capsularis.* Jute belongs to the Linden family of plants. It is a native of tropical regions and most extensively cultivated in India. The product is most familiar to us as covering for cotton bales, but only the coarsest kinds are used for such fabrics. Excellent carpets, mats, canvas and similar goods are made from it, and it also makes very good paper.

Seed sown May 7. Grew slowly at first, but after the weather got really hot it pushed ahead. By July 15 was 30 inches high. By August 15, 48 inches. September 1, 60 inches; a severe drought having set in, growth almost ceased. By October 1 was 6 feet high, in full flower. Capsules matured rapidly and were nearly all ripe when the plants were cut down by frost, October 19. Our soil was not rich enough for this plant, but the experiment showed that jute is a very easy and certain crop to grow upon rich, moist soil. For the bottom lands of our larger rivers, especially where rice is now grown, jute can be grown with ease and at a very small cost.

The question of profit depends largely upon the ability of the grower to prepare the fiber by machinery. It cannot be economically prepared by hand. It is believed that there are now several practical machines available for working raw jute, ramie, and similar fibers, and it is likely that the near future will see a great increase in the cultivation of this class of plants.

In practical culture the seed is sown broadcast, or in drills 6 inches apart, in either case not covered more than ½ inch. Being a tropical plant, it must not be sown until the weather is quite warm—June 1 is sufficiently early. On rich lands, subject to irrigation or "flooding," as for rice, the stalks will grow 15 to 18 feet high. They may be cut with a strong mowing machine or by hand. Jute must always be cut when in flower, as the fiber deteriorates rapidly after the flowering period. The plants are left to dry for a few days, or until the leaves fall off. They are then ready for decorticating and preparing the fiber for market. The yield is very heavy. The cleaned fiber is worth 2½ to 4½ cents per pound in the New York market.

Japanese Hemp.—*Cannabis sativa, japonica.* This is a Japanese variety of the common hemp plant, viz: *cannabis sativa, japonica.* The common hemp, formerly and yet largely grown in the western and northern States, does not succeed well in this State. The Japanese variety does. Dr. Felix Fremery, of California, has experimented more extensively with this plant than any one else, and finds it the most profitable of all fiber plants. This plant requires the same sort of soil and treatment and handling as jute, and will grow wherever jute will. Dr. Fremery finds it more than twice as profitable as jute. He says he can, and does with irrigation, in California grow two crops per annum, each of 15 feet. The fiber sells in the New York market for 6½ to 7½ cents per pound for the standard quality, and there is a nearly unlimited demand.

With us seed grown in California by Dr. Fremery was sown April 27 in rows 18 inches apart. Germinated slowly and became quite weedy, but after two hand weedings shaded the ground sufficiently to prevent further growth from weeds. By June 15 was 24 inches high and very leafy. By August 1 was 6 feet tall and in flower. It should have been cut for fiber at this date, but we let it stand. It grew but little after August, as a drought set in and continued until cool weather. The plants remained green until cut down by the frost October 19. The soil we used for this plat was a rather poor and stiff red clay upland infested by nut-grass. The behavior shows that upon suitable soil this plant would have done finely. We know no reason why the rice planters of the State cannot profitably grow this crop. Dr. Fremery estimates that when he can secure two crops (from same roots) per annum, each crop averaging 12 feet high, the cost of the clean fibre, handled by machinery, is about 2 cents per pound. The selling price in New York is never less than 6 cents.

Persian Hemp.—*Cannabis sativa, persica.* This is a Persian variety of the common hemp. It runs to seed rather than to fiber, and would be profitable only for its seed as food for poultry and birds, or to extract the oil. Planted same date as Japanese hemp. Persian hemp grew slower and attained an extreme height of only 3 feet. It seeded abundantly.

Common Hemp.—*Cannabis sativa.* Planted at same time as the other varieties, common hemp proved almost an entire failure, and did so poorly it was given over to the weeds after July 1.

Ramie.—*Urtica nivea.* Seeds of ramie were sown in pans in doors. The seed started fairly—grew well until about ½ inch high, when they were all killed by exposing the pans to full sunlight at a window. The pans were again sown, and by keeping in weak light were grown to 2 inches high. Were then transplanted to pots and finally to the field, where they all died. This plant is very tender when young and difficult to grow from seed. It is quite easy, however, to propogate by root cutting, and we shall try this way next season.

Ramie is a perennial of the nettle family, producing a beautiful valuable fiber much resembling silk. Recent improvements in machinery, for cleaning the fiber, promise to make this a staple crop for warm, moist climates.

NOTE.

The Station has for distribution, this spring, small lots of the following seeds and roots. These will be sent only to those who agree to plant and care for them according to our directions, and who will report the result to the Station in the fall. Eight cents (for ramie 15 cents) in postage stamps must be sent with each request, to prepay mailing charges. Hemp and ramie will be sent only to applicants in the eastern district of the State:

Rice pea.
Pearson bean.
Japanese hemp.
Ramie (roots).